

Rapid Watershed Assessment

Resource Profile

Watonwan (MN) HUC: 7020010



Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land-owners and local leaders set priorities and determine the best actions to achieve their goals.

Introduction

The Watonwan 8-Digit Hydrologic Unit Code (HUC) subbasin is located in the Prairie Parkland Ecological Province of Southwestern Minnesota. This largely agricultural watershed is 561,610 acres in size. Over ninety seven percent of the subbasin is privately owned land, with the remainder being owned by public entities.

There are 1,206 farms in the subbasin. About 45 percent of the operations are less than 180 acres in size, over 45 percent are 180 to 1,000 acres in size, and the remaining farms are more than 1,000 acres in size. Most of the producers are full time operators and do not rely on off-farm income.

The main resource concerns on the cropland are wind and water soil erosion, nutrient management, and water quality. Associated with the cropland runoff are increased pollutant loadings to surface waters (mercury, nitrogen, nitrate, turbidity, fecal coliform). Declining wildlife habitat is also a concern throughout the subbasin.



County Totals

County	Acres in HUC	% HUC
Blue Earth	59,299.98	10.6
Brown	35,534.54	6.3
Cottonwood	126,707.12	22.6
Jackson	6,204.54	1.1
Martin	53,465.87	9.5
Watonwan	280,409.99	49.9
Total acres:	561,609.8	100



Physical Description

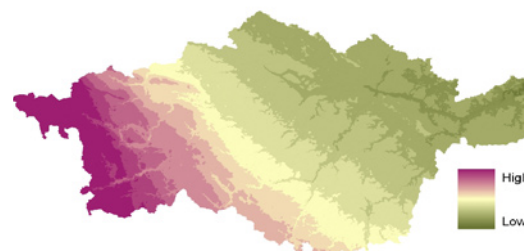
The Watonwan watershed is located in the Minnesota River Prairie subsection of Minnesota's ecological classification system. Soils in this HUC are predominantly glacial till plains. Average elevation in the watershed is 1370 feet above sea level, with the highest values being in the western portions of the watershed, while the lowest are found across the central and eastern regions.

Precipitation in the watershed ranges from 25 to 29 inches annually. Most lands within this watershed are not highly erodible, and are well to moderately well suited to agricultural uses. Predominate land uses are row crops (86%), grass/pasture/hay (6%), and Forest (2.75%).

Land use within the Watonwan Watershed is primarily agricultural, accounting for approximately 86% of the available acres. Two-year corn/soybean rotations comprise approximately 93% of croppeds lands within the watershed; small grains, hay, and grasslands enrolled in the Conservation Reserve Program (CRP) make up the majority of the balance.

Development pressure is moderate, with occasional farms being parceled out for recreation or country homes.

Relief

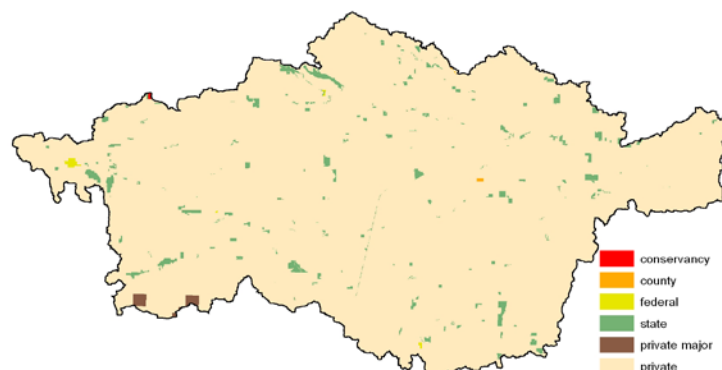


Average Precipitation (inches)



Ownership*

Ownership Type	Acres	% of HUC
Conservancy	62.5	0.01
County	102.0	0.02
Federal	495.7	0.09
Private Major	1,156.1	0.21
State-Misc.	11,661.6	2.08
Other Public	0.0	0.00
Tribal	0.0	0.00
Private	548,145.01	97.60
Ownership Totals:	561,609.8	100

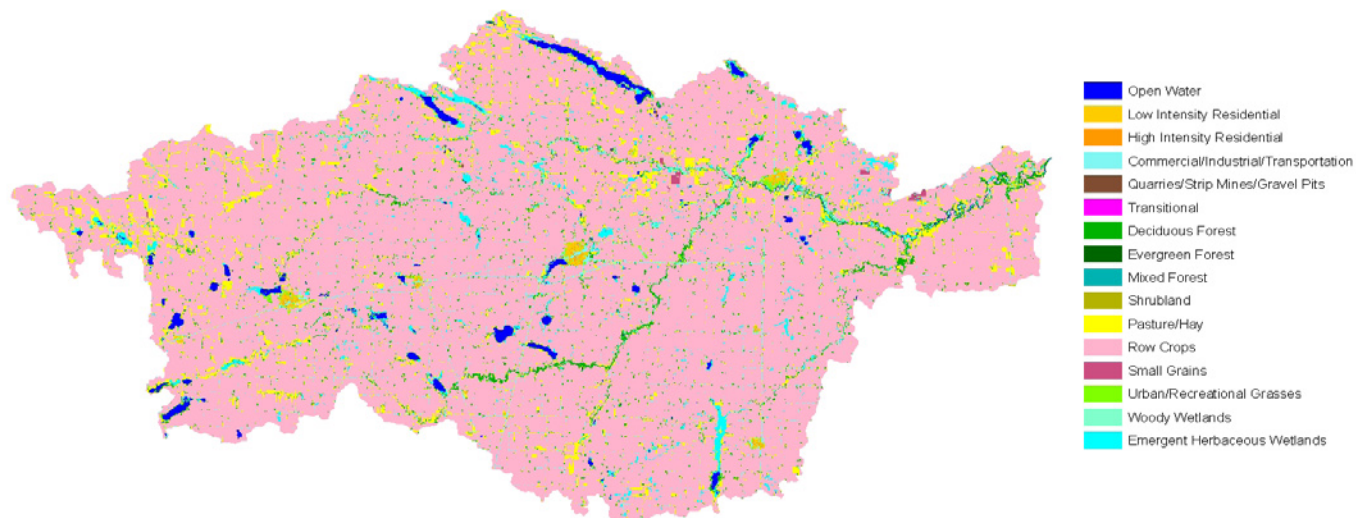


* Ownership totals derived from 2007 MN DNR GAP Stewardship data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Watonwan watershed covers an area of 561,610 acres. Over ninety seven percent of the land in the watershed is owned by private landholders (548,145 acres). The second largest ownership type is State, with approximately 11,660 acres (2.08%), followed by Private Major with approximately 1,156 acres (0.21%), and Federal with 495 acres (0.09%). State lands amount to 102 acres (0.02%), and conservancy land holdings comprise the smallest ownership class, covering slightly less than 63 acres. Ownership data indicates no tribally owned or managed lands. Land use by ownership type is represented in the table below.

Land Use / Land Cover ^{/2}



Ownership / Land Use ^{/3}

Landcover/Use	Public		Private**		Tribal		Total Acres	Percent
	Acres	Percent	Acres	Percent	Acres	Percent		
Forest	584.7	0.10	14,730.13	2.62	0.0	0.00	15314.80	2.73%
Grain Crops	66.8	0.01	538.56	0.10	0.0	0.00	605.35	0.11%
Grass, etc	1,700.4	0.30	31,741.36	5.65	0.0	0.00	33441.74	5.95%
Orchards	0.0	0.00	0.00	0.00	0.0	0.00	0.00	0.00%
Row Crops	5,861.1	1.04	476,404.14	84.83	0.0	0.00	482265.20	85.87%
Shrub etc	0.7	0.00	121.67	0.02	0.0	0.00	122.32	0.02%
Wetlands	3,269.2	0.58	10,860.92	1.93	0.0	0.00	14130.10	2.52%
Residential/Commercial	107.48	0.02	8,301.72	1.48	0.0	0.00	8409.20	1.50%
Open Water*	664.74	0.12	6665.39	1.19	0.0	0.00	7330.13	1.31%

* ownership undetermined

** includes private-major

Totals:	12,254.95	2.18%	549,364	97.82%	0.0	0.00%	561609.80	100.00%
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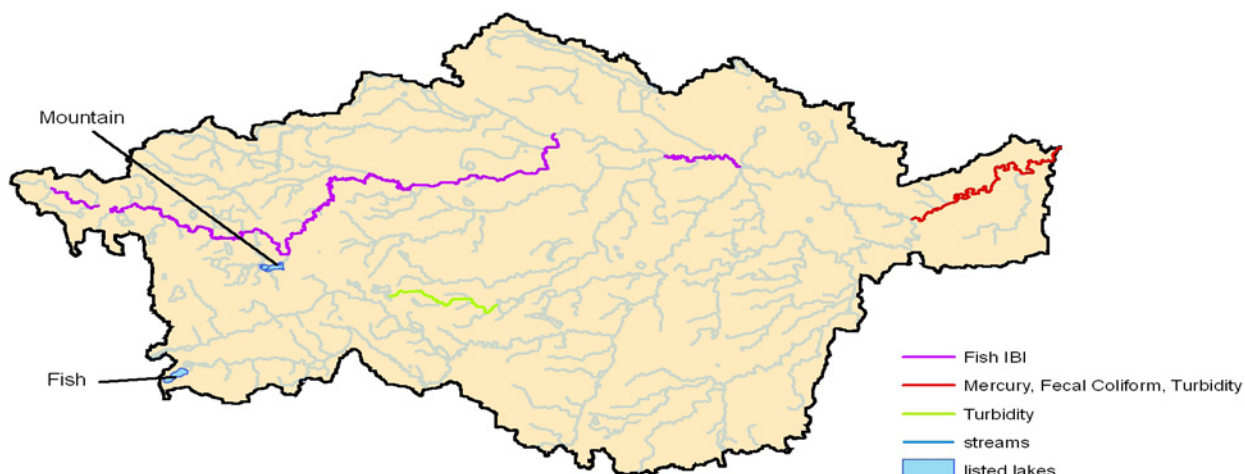
Physical Description (continued)

		ACRES	cu. ft./sec	
Stream Flow Data	USGS 05319500 WATONWAN RIVER NEAR GARDEN CITY, MN	2005 Total Avg.	380.6	
		2006 May – Sept. Avg.	497.6	
Stream Data ^{/4} (*Percent of Total HUC Stream Miles)		ACRES/MILES	PERCENT	
	Total Miles – Major (100K Hydro GIS Layer)	920	---	
	303d/TMDL Listed Streams (DEQ)	208	23.0%	
Riparian Land Cover/Land Use ^{/5} (Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)	Dev/Barren	197	0.9%	
	Fallow	0	0%	
	Forest	2,689	12%	
	Grain Crops	20	0.1%	
	Grass/Pasture	2,818	13%	
	Orchards/Vine	0	0%	
	Row Crops	12,301	55%	
	Shrub/Range	10	0.04%	
	Water	1,239	6%	
	Wetlands	2,912	13%	
		Total Buffer Acres	22,186	---
Crop and Pastureland Land Capability Class ^{/6} (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	1 – slight limitations	89,200	18%	
	2 – moderate limitations	325,800	67%	
	3 – severe limitations	56,200	12%	
	4 – very severe limitations	2,800	0.6%	
	5 – no erosion hazard, but other limitations	2,100	0.4%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	1,500	0.3%	
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat	1,300	0.2%	
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	6,000	1%	
		Total Croplands & Pasturelands	688,200	---
	TYPE OF LAND	ACRES	% of Irrigated Lands	% of HUC
Irrigated Lands ^{/7} (1997 NRI Estimates for Non-Federal Lands Only)	Cultivated Cropland	0	0%	0%
	Uncultivated Cropland	0	0%	0%
	Pastureland	0	0%	0%
	Total Irrigated Lands	0	0%	0%

Assessment of Waters

Section 303(d) of the Clean Water Act states that water bodies with impaired use(s) must be placed on a state's impaired waters list. A water body is "Impaired" or polluted when it fails to meet one or more of the Federal Clean Water Act's water quality standards. Federal Standards exist for basic pollutants such as sediment, bacteria, nutrients, and mercury. The Clean Water Act requires the Minnesota Pollution Control Agency (MPCA) to identify and restore impaired waters.

Minnesota's impaired waters list, updated every two years, identifies assessed waters that do not meet water quality standards. The primary tool for addressing impaired waters is a pollution reduction plan called a Total Maximum Daily Load, or TMDL. After impaired use(s) have been identified, the TMDL process identifies all sources of each pollutant. The plan then determines how much each source must reduce its contribution in order to meet the applicable water quality standard. The Clean Water Act requires a completed TMDL for each water quality violation identified on a state's impaired waters list. Lakes or river reaches with multiple impairments require multiple TMDLs.



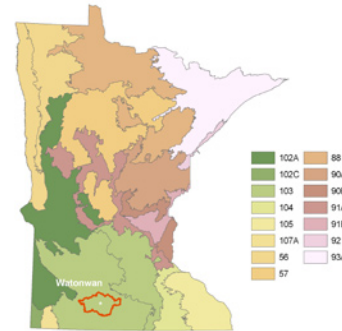
Listed Stream / Reach [®]	Impairment	Affected Use
Watonwan River; Perch Cr to Blue Earth R	Mercury, Fecal Coliform, Turbidity	Aquatic Life, Aquatic Recreation, Aquatic Consumption
St James Creek; Headwaters to Kansas Lk	Turbidity	Aquatic Life, Aquatic Recreation, Aquatic Consumption
Watonwan River; Butterfield Cr to South Fk Watonwan R	Fish IBI	Aquatic Life
Watonwan River; Headwaters to North Fk Watonwan R	Fish IBI	Aquatic Life
Listed Lake	Impairment	Affected Use
Mountain	Mercury	Aquatic Consumption
Fish	Mercury	Aquatic Consumption

Common Resource Areas

The Watonwan Watershed is located within a single common resource area, CRA 103.1. ^{/9}

103.1 – Iowa and Minnesota Till Prairies: Primarily loamy glacial till soils with scattered lacustrine areas, potholes, outwash and flood plains. Nearly level to gently undulating with relatively short slopes. Most of the wet soils have been artificially drained to maximize crop production.

Primary land use is cropland. Corn, soybeans, sugar beets, peas and sweet corn are the major crops. Native vegetation was dominantly tall grass prairie. Resource concerns are water and wind erosion, nutrient management, and water quality.



Only the major CRA units are described above.
For further information, go to:
<http://soils.usda.gov/survey/geography/cra.html>

Geology / Soils ^{/10}

The oldest and deepest rocks in the watershed are Precambrian in age. Found primarily in the western third of the watershed, these hard, relatively impermeable, crystalline rocks are of igneous and metamorphic origins. Overlying the Precambrian rocks to the west and comprising the primary bedrock in a west to east gradient through the remaining two thirds of the watershed are Cambrian and then Ordovician sedimentary rocks. Pleistocene glacial deposits cover almost the entire watershed and are predominantly till, an unstratified mixture of clay, silt, sand, and gravel. Within the center of the watershed, a flatlying, thin clay deposit is present on top of the till, a remnant lake bed of “glacial” Lake Minnesota.

Overall, geomorphology of the watershed can be described as nearly level to gently rolling surficial till deposits with almost imperceptible slopes. The surface relief descends from three directions, converging from the east, west, and south toward the central portion of the watershed. The western half of the watershed lies primarily within the Blue Earth Till Plain. Landscapes within this till plain are characterized as being a complex mixture of gently sloping (2-6%) well drained loamy soils and nearly level (0-2%) poorly drained loamy soils. Artificial drainage to remove ponded water from flat and depressional areas is extensive. Water erosion potential is moderate on much of lands (46%) within this geomorphic setting.

Geomorphology of the eastern half of the watershed is a complex mixture of glacial lake plains, till plains, and moraines. Sections of the “glacial” Minnesota Lake Plain are located in the eastern half of the Blue Earth River Watershed (within the western half of the Le Sueur River Subwatershed and the southeastern corner of the Watonwan River subwatershed). Landscapes within the lake plain are characterized as nearly level with poorly drained or very poorly-drained clayey or silty clay soils. Subsurface and surface tiling are extensively used in this region of the watershed, but internal drainage remains poor. The majority of lands within this geomorphic setting are not bordered by streams, lakes or drainage ditches. Roughly 58% of these lands have a low water erosion potential.

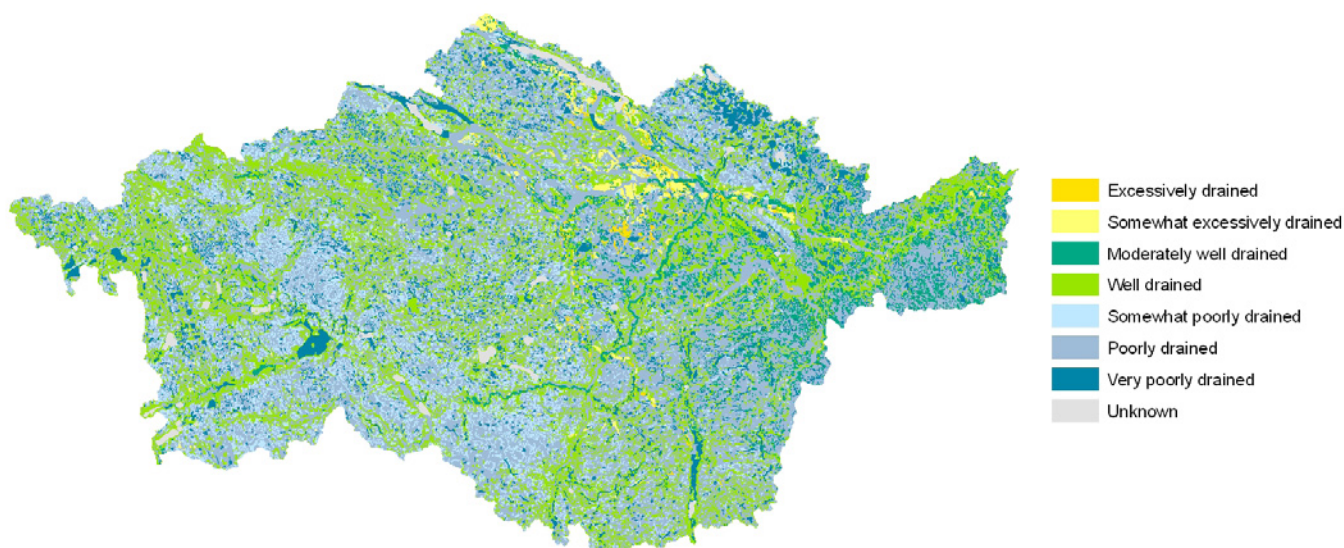
The western, southern and eastern boundaries of the watershed are end moraines formed by Pleistocene glaciers. Various ground moraines are also contained in the eastern half of the watershed. In general, these morainal complexes exhibit a undulating to hilly landscape with slopes ranging from 2-12%. Approximately one fourth of these lands are adjacent to streams and ditches, thus creating a moderate potential for sediment delivery to streams. Soils are predominantly loamy in texture. The majority of agricultural lands within the watershed’s morainal complexes are moderately steep and well drained, although, approx. 25% of these tilled lands are nearly level, poorly drained, requiring tile drainage. Fifty percent of the cropped lands within this geomorphic setting have a high potential for water erosion.

Visit the online Web Soil Survey at
<http://websoilsurvey.nrcs.usda.gov> for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at
<http://soildatamart.usda.gov> to download SSURGO certified soil tabular and spatial data.

Drainage Classification

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil.

Seven classes of natural soil drainage are recognized—excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the “Soil Survey Manual.”



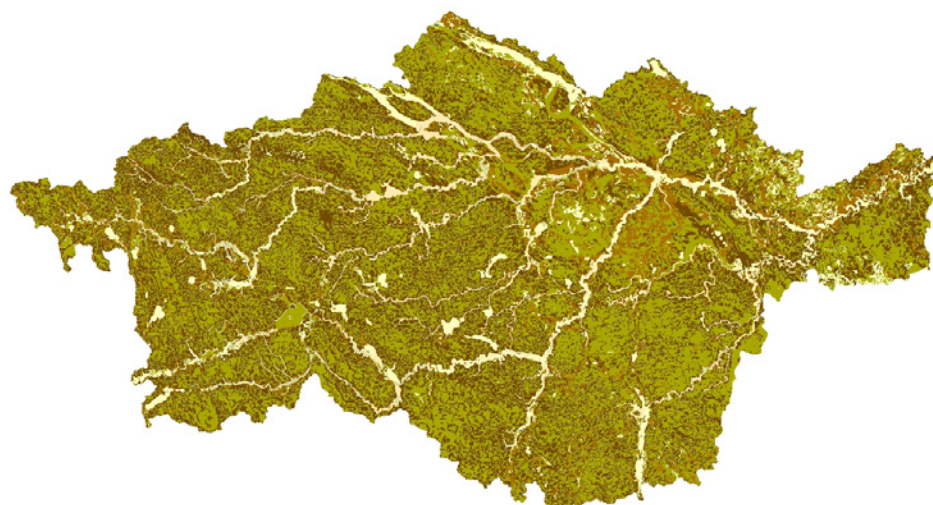
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Farmland Classification





Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland.

Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops.

NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No 21, January 31, 1978.



Farmland Classification

-  All areas are prime farmland
-  Farmland of statewide importance
-  Prime farmland if drained
-  Prime farmland if drained and protected from flooding
-  Prime farmland if protected from flooding
-  Not prime farmland

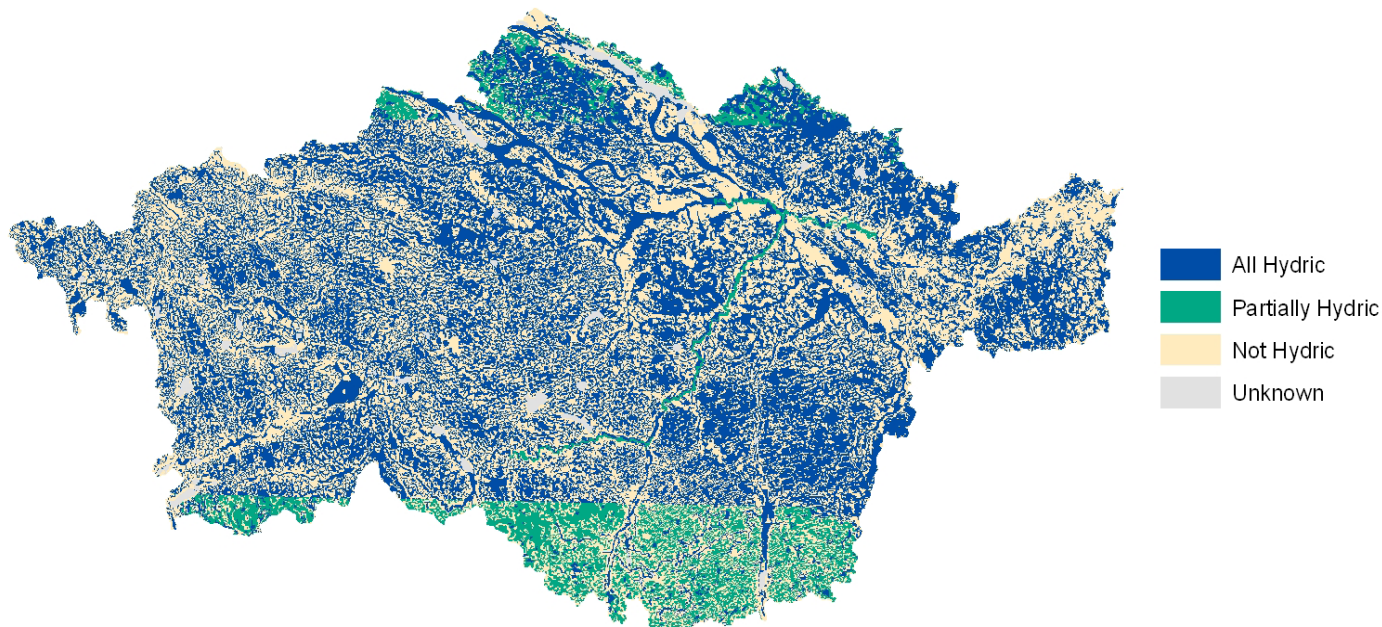
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Hydric Soils

This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions of nonhydric soils in the higher positions on the landform. Map units of dominantly non-hydric soils may therefore have inclusions of hydric soils in the lower positions on the landform.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as “soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part” (Federal Register 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field.



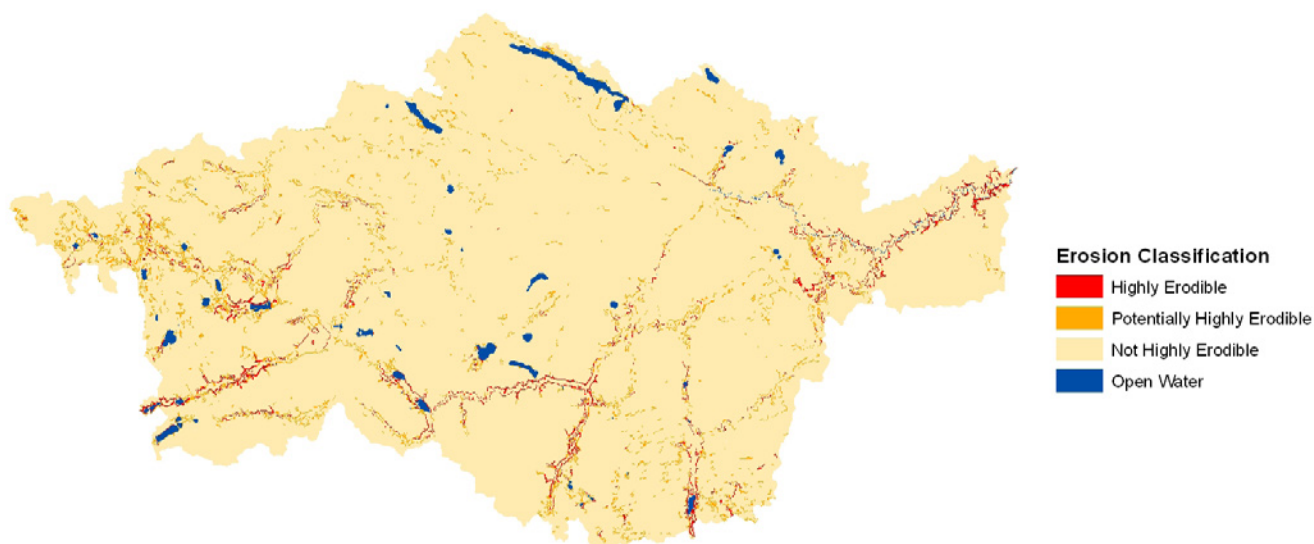
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Highly Erodible Land (HEL)

The erodibility index (EI) for a soil map unit is determined by dividing the potential erodibility for the soil map unit by the soil loss tolerance (T) value established for the soil in the FOTG as of January 1, 1990.

A soil map unit with an EI of 8 or greater is considered to be highly erodible land (HEL).

Potential erodibility is based on default values for rainfall amount and intensity, percent and length of slope, surface texture and organic matter, permeability, and plant cover. Actual erodibility and EI for any specific map unit depends on the actual values for these properties.



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Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management.

The criteria used in grouping the soils does not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.



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Performance Results System and Other Data

NRCS Conservation treatment practices applied or prescribed within the Watonwan watershed in the three year reporting period have primarily concentrated on Conservation Tillage (7,613 acres/yr average), Conservation Crop Rotations (6039 acres/yr), Prescribed Grazing (4,008 acres/yr), Wildlife Habitat (2,329 acres/yr), and Nutrient Management (2,259 acres/yr). Significant efforts have been made in areas of air quality/wind erosion management, with the average addition of 19,289 feet of windbreak.

Conservation Treatment Acres	NRCS Practice Code	FY 04	FY 05	FY 06	Avg/Year	Total
Waste Management (Number)	313, 317, 359	1	3	0	1	4
Buffers (Acres)	391, 393	115	141	247	168	503
Erosion Control (Acres)	311, 332, 589, 386, 412, 600, 601, 603, 380, 650	806	4	508	439	1318
Irrigation Water Management (Acres)	449	110	0	110	73	220
Wind Break (ft)	380	23,743	11,561	22,564	19289	57868
Atmospheric Resource Quality Management (Acres)	370	0	0	0	0	0
Nutrient Management (Acres)	590	992	3,572	2,195	2253	6759
Pest Management (Acres)	595	1,211	901	534	882	2646
Prescribed Grazing (Acres)	528, 472, 528A	951	1,791	9,283	4008	12025
Prescribed Burning (Acres)	338	0	11	0	4	11
Trees & Shrubs (Acres)	612, 666	11	0	58	23	69
Conservation Tillage (Acres)	329A, 329B, 329C	6,092	4,785	11,961	7613	22838
Conservation Crop Rotations (Acres)	328	6,182	3,823	8,113	6039	18118
Cover Crops (Acres)	340	4	1,093	0	366	1097
Wildlife Habitat (Acres)	644, 645	215	1,950	4,823	2329	6988
Brush Management (Acres)	314	0	0	0	0	0
Restoration of Declining Habitat (Acres)	643	339	699	669	569	1707
Wetland Wildlife Habitat Management (Acres)	644	60	624	92	259	776
Wetlands (Acres)	657, 658, 659	605	419	308	444	1332
LANDS REMOVED FROM PRODUCTION THROUGH FARM BILL PROGRAMS¹¹						
Program				Acres		
Conservation Reserve Program (CRP)				5,893		
Wetland Restoration Program (WRP)				298		
Conservation Reserve Enhancement Program (CREP)				5,525		

Socioeconomic and Agricultural Data (Relevant)

Estimates for the Watonwan subbasin indicate a population of just under 27,400 people. Median household income throughout the district is \$36,280 yearly, roughly 78% of the national average. Sixty seven percent of the population over the age of 18 is active in the workforce, and approximately 10% of the residents in the watershed are below the national poverty level.



There are 1,206 farms in the subbasin. About 45 percent of the operations are less than 180 acres in size, over 45 percent are 180 to 1,000 acres in size, and the remaining farms are more than 1,000 acres in size. Most of the producers are full time operators and do not rely on off-farm income.

Watonwan (MN) HUC # 7010010 ¹²		
Population Data	Watershed Population	27,387
	Unemployment Rate	33%
	Median Household Income	36,280
	% below poverty level	10%
	Median Value of Home	68,300
Farms	# of Farms	1,206
	# of Operators	1,206
	# of Full Time Operators	912
	# of Part Time Operators	294
	Total Crop/Pasturelands	484,900
Farm Size	1 to 49 Acres	138
	50 to 179 Acres	131
	180 to 499 Acres	160
	500 to 999 Acres	114
	1,000 Acres or more	65
Livestock & Poultry	Cattle - Beef	36,871
	Cattle - Dairy	6,775
	Chicken	88,303
	Swine	566,452
	Turkey	233,587
	Other	6,166
	Animal Count Total:	938,152
Chem (Acres Applied)	Total Permitted AFO's	530
	Insecticides	6,530
	Herbicides	90,425
	Wormicides	0
	Fruiticides	151
	Total Chemicals	97,106
	% State Chemical Totals	2.08%

RESOURCE CONCERNS

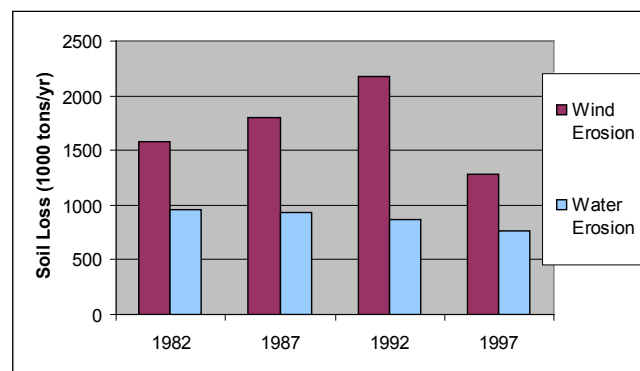
County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:



- **Soil Quality, Excessive Sheet and Rill Erosion.** Soil Erosion and Deposition has ranked as a top concern in each county within the watershed. Areas with soil loss exceeding 2 x "T" or exhibiting excessive gully erosion are identified as high priorities in local water plans.
- **Soil Quality, Excessive Wind Erosion.** Prairie Topography makes wind erosion a major conservation issue. Wind erosion physically removes the lighter, less dense soil constituents such as organic matter, clays, silts, thus removing the fertile part of the soil and lowering productivity.
- **Surface Water Quality, Nutrients.** Reduction of priority pollutants and sediments in surface waters is a priority issue throughout the watershed. Excessive amounts of sediments, nutrients, and bacteria degrade the water quality causing an unbalanced fish community with depressed populations and limited diversity.
- **Ground Water Quality, Nutrients, Organics, Animal and Human Waste.** Aging septic systems, feedlot runoff, cropland nutrient runoff, tilling practices, and abandoned wells all pose significant threats to groundwater quality throughout the region.
- **Installation of waste control systems on High Priority Feedlots.** Feedlots discharging pollutants to designated public waters or a sinkhole or shallow soils overlying fractured bedrock or within 100 feet of a water well pose threats to both surface and groundwater quality. Installation at operations either cited by the MPCA or determined to pose significant hazards is the foremost priority.

- Sheet and rill erosion by water on the cropland and pastureland declined by approximately 199,400 tons (20.71%) of soil from 1982 to 1997.
- NRI estimates indicate wind erosion rates decreased by 300,500 tons (18.98%) of soil from 1982 to 1997

/13



Federally Listed Threatened And Endangered Species /14

ENDANGERED SPECIES	CANDIDATE SPECIES
Fish – Topeka Shiner	Insect – Dakota Skipper
THREATENED SPECIES	Species of Special Concern
Plants – Prairie Bush Clover	Common Moorhen, Eastern Spotted Skunk
Essential Habitat - -Prairie river and stream habitat for the Topeka Shiner. Gravelly soil, dry to mesic prairie for the Prairie bush-clover	

Watershed Projects, Plans and Monitoring

- **Blue Earth River Basin Implementation Framework**
 - Water Resources Center, MSU, Mankato
- **Greater Blue Earth River Watershed Initiative**
 - Three Rivers Resource Conservation & Dev. Council
- **Blue Earth River Watershed CSP**
 - Natural Resources Conservation Service MN
- **Lake Hanska Watershed Wet Area Inventory**
 - Minnesota Department of Natural Resources
- **Mountain Lake Project CWP**
 - MN DNR / Cottonwood County SWCD
- **Watonwan River Dump/Erosion Site Survey**
 - Watonwan County Soil and Water Conservation District
- **Greater Blue Earth River Targeted Watersheds Grant**
 - US Environmental Protection Agency
- **St. James Lake - Lake Assessment Program**
 - Minnesota Pollution Control Agency
- **Minnesota River Turbidity TMDL Work Plan**
 - Minnesota Pollution Control Agency
- **MRAP Biological & Toxicological Assessment**
 - Minnesota Pollution Control Agency
- **MRAP Land Use Assessment Levels III, IV**
 - Minnesota Pollution Control Agency
- **South Central MN Comprehensive County Water Planning Project,**
 - Minnesota River Basin Joint Powers Board

* Have a watershed project you'd like to see included? Submit suggestions online @ <http://www.mn.nrcs.usda.gov/technical/rwa/>

Conservation Districts, Organizations & Partners

- **Area II Minnesota River Basin Projects, Inc**
 - 1400 E Lyon Street, Bx 267 Marshall, MN 56258
 - Phone 507-537-6369 Fax 507-537-6368
- **Black Dog Water Management Commission**
 - 100 Civic Center Pkwy, Burnsville, MN 55337
 - Phone 952-895-4505
- **Blue Earth Co. Soil & Water Conservation District**
 - 1160 Victory Dr #3 Mankato, MN 56001-5307
 - Phone 507-345-4744
- **Blue Earth Basin Initiative (BERBI)**
 - 426 Winnebago Ave, #100 Fairmont, MN 56031
 - Phone 507-238-5449
- **Brown Co. Soil and Water Conservation District**
 - 300 2nd Avenue SW Sleepy Eye, MN 56085
 - Phone 507-794-2553
- **Cottonwood Co. Soil & Water Conservation District**
 - 339 9th St, Windom, MN 56101
 - Phone (507) 831-1153
- **Faribault Co. Soil & Water Conservation District**
 - 415 South Grove Street #8, Blue Earth MN 56013
 - Phone 507-526-2388
- **Freeborn Co. Soil & Water Conservation District**
 - 1400 W Main St Albert Lea, MN 56007
 - Phone 507-373-5607
- **Jackson Co. Soil & Water Conservation District**
 - Rt. 2 Box 9, S Highway 86 Lakefield, MN 56150
 - Phone 507-662-6682
- **Martin Co. Soil and Water Conservation District**
 - 932 N State Street #170 Fairmont, MN 56031
 - Phone 507-235-6680
- **Minnesota River Basin Joint Powers Board**
 - 600 E. 4th St Chaska, MN 55318-2108
 - Phone 952-361-6590 Fax 952-361-6594
- **Nicollet Co. Soil & Water Conservation District**
 - 501 South Minnesota Avenue St. Peter, MN 56082
 - Phone 507- 931-6800
- **Three Rivers Resource and Development Council**
 - 1160 Victory Drive Suite 4 Mankato, MN 56001
 - Phone 507-345-7418 ext. 5
- **South Central Comprehensive Water Plan Joint Powers Board**
 - P.O. Box 248, New Ulm, MN 56073
 - Phone 507-233-6642
- **Prairie Country RC&D**
 - 1005 High Avenue NE Willmar, MN 56201-4817
 - Phone 320-231-0008 Fax 320-235-8151
- **Watonwan Co. Soil & Water Conservation Dist**
 - 823 1st AVE. S., Suite 2 St. James, MN 56081
 - Phone 507-375-3104

Footnotes / Bibliography

1. Ownership Layer – Source: MN Stewardship Data: Minnesota Department of Natural Resources, Section of Wildlife, BRW, Inc, 2007. This is the complete GAP Stewardship database containing land ownership information for the entire state of Minnesota. Date of source material is variable and ranges from 1976 to 2007, although a date range of 1983 to 1985 predominates. Land interest is expressed only when some organization owns or administers more than 50% of a forty except where DNR could create sub-forty accuracy polygons.
2. National Land Cover Dataset (NLCD) - Originator: U.S. Geological Survey (USGS); Publication date: 19990631; Title: Minnesota Land Cover Data Set, Edition: 1; Geospatial data presentation form: Raster digital data; Publisher: U.S. Geological Survey, Sioux Falls, SD, USA.
3. Ownership layer classes grouped to calculate Public ownership vs. Private and Tribal ownership by Minnesota NRCS Rapid Watershed Assessment Staff. Land cover / Land use data was then extracted from the National Landcover Dataset Classification System and related to ownership class polygons.
4. USGS 1:100,000 Hydrography Layer .This data set represents all features coded as ‘rivers’ on the USGS 1:100,000-scale DLG Hydrography data set. This current version was converted to ARC/INFO by the Land Management Information Center and edge-matched across map sheet boundaries. Minnesota DNR made further modifications to the files, verified lake feature identifiers, and created a state layer from the separate 100k data. The Hydro 100k layer was compared to MPCA’s 303(d) data to derive percentage of listed waters.
5. Land Cover / Land Use / Hydro 100k Buffer. Using the 100k Hydrology dataset, All streams within HUC were spatially buffered to a distance of 100 ft. National Landcover Dataset attributes were extracted for the spatial buffer to demonstrate the vegetation and landuse in vulnerable areas adjacent to waterways.
6. Land Capability Class. ESTIMATES FROM THE 1997 NRI DATABASE (REVISED DECEMBER 2000) REPLACE ALL PREVIOUS REPORTS AND ESTIMATES. Comparisons made using data published for the 1982, 1987, or 1992 NRI may produce erroneous results. This is because of changes in statistical estimation protocols and because all data collected prior to 1997 were simultaneously reviewed (edited) as 1997 NRI data were collected. All definitions are available in the glossary. In addition, this December 2000 revision of the 1997 NRI data updates information released in December 1999 and corrects a computer error discovered in March 2000. For more information: <http://www.nrcs.usda.gov/technical/NRI/>
7. 1997 NRI Irrigated Land Estimates. Irrigated land: Land that shows evidence of being irrigated during the year of the inventory or during two or more years out of the last four years. Water is supplied to crops by ditches, pipes, or other conduits. Water spreading is not considered irrigation; it is recorded as a conservation practice. [NRI-97] For more information: <http://www.nrcs.usda.gov/technical/NRI/>
8. 303(d) Stream data. Minnesota’s Final Impaired Waters (per Section 303(d) Clean Water Act), 2006. Data obtained from Minnesota Pollution Control Agency (MPCA). The Minnesota Pollution Control Agency (MPCA) helps protect state water by monitoring quality, setting standards and controlling inputs through the development of TMDL plans. <http://www.pca.state.mn.us/water/tmdl/index.html#maps>.

Footnotes / Bibliography (continued)

9. National Coordinated Common Resource Area (CRA) Geographic Database. A Common Resource Area (CRA) map delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area

10. Soil Survey Geographic Database (SSURGO) Tabular and spatial data obtained from NRCS Soil Data Mart at <http://soildatamart.nrcs.gov>. Publication dates vary by county. Component and layer tables were linked to the spatial data via SDV 5.1 and ARCGIS 9.1 to derive the soil classifications presented in these examples. Highly Erodible Land Classification Data obtained from USDA/NRCS EFOTG Section II, County Soil Data. HEL classifications were appended to SSURGO spatial data via an ARCEdit session. Addendum and publication dates vary by county. Geological description: Van Voast, W. A., Broussard, W. L., and Wheat, D. E., 1972, Water resources of the Minnesota River-southwestern Minnesota: U.S. Geol. Survey Hydrol. Inv. Atlas, HA-391.

11. Lands removed from production through farm bill programs. County enrollment derived from the following: CRP Acres: www.fsa.usda.gov/crpstorpt/07Approved/r1sumyr/mn.htm (7/30/04). CREP Acres: <http://www.bwsr.state.mn.us/easements/crep/easementssummary.html> (7/31/03). WRP Acres: NRCS (8/16/04). Data were obtained by county and adjusted by percent of HUC in the county.

12. Socioeconomic and Agricultural Census Data were taken from the U.S. Population Census, 2000 and 2002 Agricultural Census and adjusted by percent of HUC in the county or by percent of zip code area in the HUC, depending on the level of data available. Data were also taken from MPCA AFO/CAFO counts provided by county for 2005.

13. 1997 NRI Estimates for sheet and rill erosion (WEQ & USLE). The NRI estimates sheet and rill erosion together using the Universal Soil Loss Equation (USLE). The Revised Universal Soil Loss Equation (RUSLE) was not used in the 1997 NRI. RUSLE was not available for previous inventories, therefore the use of USLE was continued to preserve the trending capacity of the NRI database. Wind erosion is estimated using the Wind Erosion Equation (WEQ). For further information visit <http://www.mn.nrcs.usda.gov/technical/nri/findings/erosion.htm>

14. Federally listed endangered and threatened species counts obtained from NRCS Field Office Technical Guide, Section II, Threatened and Endangered List. <http://www.nrcs.usda.gov/Technical/efotg/>. Essential fish habitat as established by Magnuson-Stevens Fishery Conservation and Management Act, Public Law 94-265, as amended through October 11, 1996 <http://www.nmfs.noaa.gov/sfa/magact/>

15. Watershed Projects, Plans, Monitoring. Natural Resources Conservation Service, Watershed Projects Planned and Authorized, <http://www.nrcs.usda.gov/programs/watershed/Purpose>.